Active Project (2015 - 2017)

Ultraprecision Pointing Accuracy for SmallSat/CubeSat Attitude Control Systems Project

SBIR/STTR Programs | Space Technology Mission Directorate (STMD)

ABSTRACT

The Phase I program concluded with the successful demonstration of a piezo enhanced pointing system targeted to the CubeSat class of satellites. The Phase I program results also surpassed the Phase I goals allowing the proposed Phase II program to further push the capabilities and design of the approach. The main objective of the Phase II program is to further quantify the performance of the Attitude Control Piezo Adaptor (ACPA) and to expand it beyond the single axis Phase I testbed into a fully characterized three-axes prototype. In addition, the Phase I analytical models will be enhanced into the three-axes system and utilized in the modeling, design, and testing of the control algorithms. QorTek plans to team with Boeing Huntington Beach to fully test and quantify the performance of the three axis prototype.

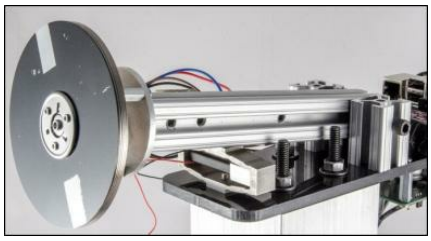
ANTICIPATED BENEFITS

To NASA funded missions:

Potential NASA Commercial Applications: Investment by NASA/NSF in SmallSats programs and projects is rapidly increasing. As already identified in previous studies, as the scope of these missions increase there will be a corresponding increase in demand for high accuracy ACS capability. This is especially true for cross formation flying, cross-link communications, and proximity, rendezvous operations, observational data, and onboard experiments. Our goal will be to make available a near-universal low cost enhancement add-on that NASA users from academia to NASA Centers can purchase and easily install between the RWA bracket and a common attachment plate that can easily be linked into legacy, or to be developed, ACS controller design to substantially increase pointing accuracy of the SmallSat/CubeSat platform

To the commercial space industry:

Potential Non-NASA Commercial Applications: QorTek is working closely with Boeing on the proposed technology and



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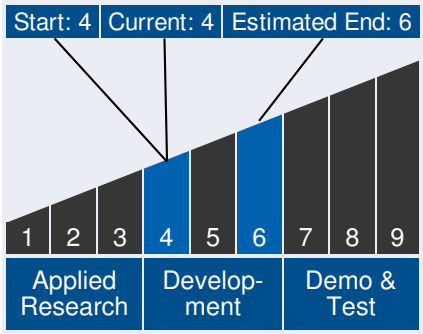

Management Team

Program Executive:

- Joseph Grant

Principal Investigator:

- Gregory Bower

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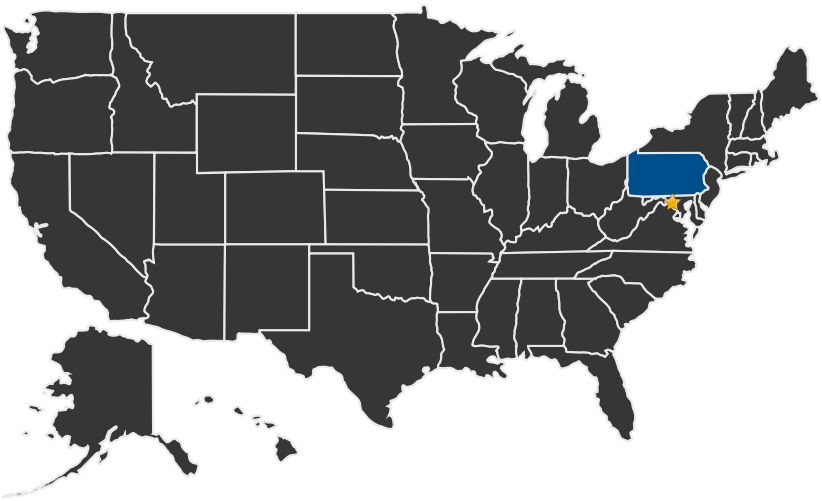
Boeing is among the single largest developers and suppliers of such SmallSats to the US military (ranging from 3U to 12U). The relationship between QorTek and Boeing will allow us to investigate integration of the ACPA into Boeing CubeSats. There are a number of other military and non-military applications for the identical technology that include fast pointing systems for active and adaptive optics, most prominently Fast Steering Mirrors that will be direct candidates for transition of the proposed new technology. QorTek is in discussions with Space Micro to integrate to precision pointing mechanism into their products and Navy ICECAP project. Space Micro has developed and used star tracking systems that can benefit from this increase in pointing precision to further enhance their CubeSat line.

U.S. WORK LOCATIONS AND KEY PARTNERS



U.S. States With Work

Lead Center:
Goddard Space Flight Center

Other Organizations Performing Work:

- QorTek, Inc. (Williamsport, PA)

Technology Areas

Communications, Navigation, and Orbital Debris Tracking and Characterization Systems (TA 5)
└ Autonomous Precision Formation Flying (TA 5.4.5)

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PROJECT LIBRARY

Presentations

- Briefing Chart
  - (http://techport.nasa.gov:80/file/17756)

DETAILS FOR TECHNOLOGY 1

Technology Title

Ultraprecision Pointing Accuracy for SmallSat/CubeSat Attitude Control Systems